1904MNRAS..64..427S

Note on the Drawings of the Mare Serenitatis by John Russell, R.A. By S. A. Saunder, M.A.

On pp. 156–159 of the present volume of the *Monthly Notices* Dr. Rambaut gives an account of two drawings of the region around Linné made by Mr. John Russell, R.A., and arrives at the conclusion that they render it probable that Linné then presented much the same appearance as at the present day when viewed with a low-power eyepiece attached to a small telescope.

The drawing reproduced in plate 3, fig. 2, has not much direct bearing on the question of change, for we are told by Mädler that near the time of full moon Linné was seen in his time as here represented, namely, as a round white spot almost as white in the middle as at the edges. It is to the drawing in fig. 1 that the real interest attaches. My own introduction to this drawing was through a photograph shown me by Dr. Rambaut, and from an inspection of this I came to the conclusion that it did offer distinct evidence of a change. As I was afterwards led to modify this opinion when, by the kindness of Dr. Rambaut, I was allowed to inspect the original, it may be not without interest that I should put on record both my first impression and the reasons which led me to modify it, as many will see the reproduction and but few can hope to have the opportunity of comparing it with the original.

Referring to plate 3, fig. 1, the only genuine marks on the floor besides Bessel and the bright streaks are :

(1) A small dark spot 0·45 in. from Bessel at position-angle 311°. This is perhaps a little more conspicuous in the original, but not much so. It almost certainly denotes Bessel A.

(2) A somewhat larger dark mark 0·61 in. from Bessel at position-angle 352°. This is much more conspicuous in the original, but careful inspection shows that it is due to a stain and is not part of Russell's drawing.

(3) The large dark mark 0·85 in. from Bessel at position-angle 70°. This is referred to by Dr. Rambaut in his note on p. 157, and, like the last, is a stain on the paper.

(4) Linné, 1·37 in. from Bessel, at position-angle 53°. This, as stated by Dr. Rambaut, is whiter and more conspicuous in the original, where also the dark curved shading to the west of the white spot is clearly seen and has every appearance of being intentional. The large dark mark trending to the south-east of the white spot has its importance exaggerated in the reproduction, where it looks decidedly like a shadow, and I was led to hope that some estimate might be formed of the height of the mountain to which it was due ; but from its faintness in the original, coupled with its southerly direc-

1904MNRAS..64..427S

> tion, I now agree with the opinion expressed by Dr. Rambaut, that it was not intended to represent a shadow. At the base of this, however, bordering the white spot on the east side, and extending a little to the south of it, is a much darker line in the original, perhaps half as thick again as the line on the west side. It is more conspicuous in the original than in the reproduction, and conveys to my mind the impression that it was really intended to represent a shadow.

We do not know the size of the refractor most frequently employed by Russell, and can only judge of its powers and of the definition on the occasion on which the drawing was made from the drawing itself. We note that Bessel A, a conspicuous crater under this illumination in a 3 or 4 inch telescope, and one which was clearly seen by Schröter, is only just indicated. The smaller craters north and north-west of Linné are not shown at all, yet at the present time these are very clearly seen with their interiors filled with shadow under similar illumination, when in my 7-inch refractor there is no trace of shadow in the white spot surrounding Linné. It should be noted, too, that at present, when Bessel is still full of shadow, the white spot round Linné has barely developed and is far from being a conspicuous object.

It must be remembered that the special purpose of the drawing was to show the real nature of Bessel, but the great care with which the detail south of the Mare is drawn shows that other parts were not neglected. We may therefore infer that the shadow in Bessel A was only just seen, that the other small craters were not seen, and yet (if my interpretation of these two dark lines is correct) that decided shadow was seen on both sides of the bright spot, marking the position of Linné, and which, if we accept the accounts of Lohrmann, Mädler, and Schmidt, we may take as denoting the floor of the crater.

If this is admitted the drawing does furnish clear evidence of a change. But, on the other hand, it was pointed out to me by Dr. Rambaut that in the drawing representing Linné under what must have been nearly vertical illumination there are similar dark borders, nearly as thick as those under consideration, to the north and south of the white spot by which Linné is there represented. These may be seen in plate 3, fig. 2; they could not possibly have been shadows, and their existence there renders doubtful the conclusion that similar marks in fig. 1 are to be taken as real shadows.

On the whole, then, the drawing, whilst, in my opinion, quite consistent with the theory of change, cannot fairly be held to prove it, and I can only regret that after looking through these drawings I have come to the conclusion that in spite of the care with which they were made there will be very great difficulty in obtaining satisfactory information from them with regard to such small changes as there is reason to think may have occurred

1904MNRAS..64..427S

from time to time upon the Moon. I may further illustrate the difficulty from the drawing now published in fig. 2. Much of the detail is evidently drawn with the greatest care, and yet the large ring shown to the north of *Cassini* does not exist upon the Moon. Careful study will show how it was suggested; but at the same time it will also show that it was only suggested, and that a part of what is there drawn has no real existence.

I cannot conclude this short note without endeavouring to express a sense of the debt which all who are interested in this question must feel that they owe to Dr. Rambaut and the staff of the Radcliffe Observatory for the care with which they have gone into the matter and the trouble they have taken, including as it did the learning of the system of shorthand in which Russell made the only notes that we have in explanation of the drawings. That the result has not been more definite is due to the inherent difficulty of the inquiry.

On the Relative Efficiency of Different Methods of Determining Longitudes on Jupiter. By A. Stanley Williams.

1. Two chief methods have been employed for the purpose of determining the longitudes or positions of markings on *Jupiter*, and therefrom the rotation period of the planet. One of these consists in recording the times when the markings appear to be exactly in mid-transit across the disc of the planet. This is termed *the method of transits*. In the other method the positions of the markings are measured with a micrometer from the preceding and following limbs of the planet, and the time of transit derived from these measures. This is termed *the micrometric method*.

2. As is well known, very great claims have been made as to the superiority of the micrometric method over the method of transits as regards the accuracy of the results obtained. Thus, the former has been described as being "infinitely preferable" to the latter; and positions determined by the method of transits have even been said to bear the same relation to those derived from the micrometric method, as eye-estimates of the position angles and distance of double stars possess with respect to micrometer measures of the same. As the number of positions already determined by the method of transits can hardly amount to less than 40,000, and as these constitute the foundation of much of our knowledge of the rotation of *Jupiter* and of the various surface currents known to exist, it seems desirable to make some inquiry into the relative efficiency of the two methods.

3. Reference should be made in this connection to some statements and comparisons on this subject by Professor G. W. Hough in *Astronomy and Astro-physics*, vol. xi. p. 193, and in *Popular*